IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF APPEALS

In re Patent Application of: **CONTI**	)	
Serial No. **10/606,189**	)	Examiner: **Z. LU**
Confirmation No. **4347**	)	Art Unit: **2682**
Filing Date: **June 25, 2003**	)	Attorney Docket No. **02GV15654470**
For: **RADIO-FREQUENCY SWITCHING DEVICE, IN PARTICULAR FOR MOBILE CELLULAR TELEPHONES**	)	

APPELLANT'S SUPPLEMENTAL APPEAL BRIEF

MS Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Responsive to the Notice of Non-Compliant Appeal Brief mailed August 22, 2007, submitted herewith is Appellant's Supplemental Appeal Brief to correct the noted informalities. If any additional extension and/or fee is required, authorization is given to charge Deposit Account No. **01-0484**.

(1) Real Party in Interest

The real party in interest is STMicroelectronics N.V., assignee of the present application as recorded at reel 14541, frame 93.

(2) Related Appeals and Interferences

At present there are no related appeals or interferences.

(3) Status of the Claims

Claims 9-16, 18-24, 26-34 and 36-40 are pending in the application, all of which are being appealed herein. Claims 1-8, 17, 25 and 35 have been cancelled.

(4) Status of the Amendments

All amendments have been entered and there are no further pending amendments. A copy of the claims involved in this appeal is attached hereto as Appendix A.

(5) Summary of the Claimed Subject Matter

The present invention, as recited in independent Claim 9, is directed to a radio-frequency (RF) switching device **DCM** comprising an input/output terminal **ANT**, a plurality of RF channels (**TX GSM**, **RX GSM**, **TX DCS/PCS**, **RX DCS** and **RX PCS**) connected to the input/output terminal, and switching means for selecting one of the plurality of RF channels based upon a switching control signal (e.g., **EC1**). See page 4, line 19 through page 5, line 14 and FIG. 1 of the present application (reproduced below).

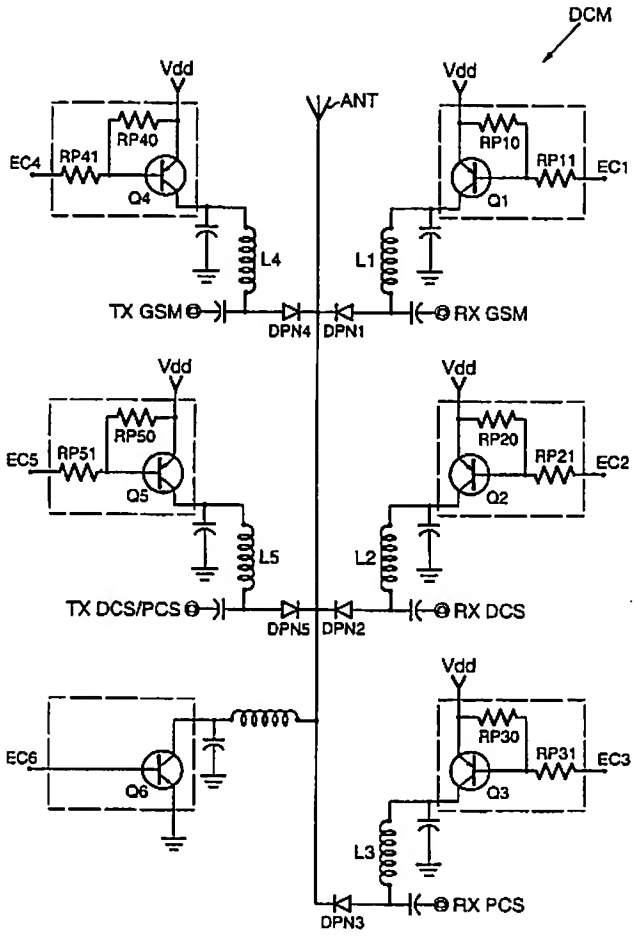


FIG. 1 of the Present Application

The switching means comprises a respective control module connected to each RF channel (e.g., **RX GSM**). Each control module comprises a control input (e.g., **EC1**) for receiving the switching control signal (e.g., **EC1**), a PIN diode (e.g., **DPN1**) having a cathode connected to the input/output terminal **ANT**, and an anode. See page 5, lines 14-21 and FIG. 1. A control transistor (e.g., **Q1**) comprises a control terminal connected to the control input, and a first conducting terminal connected to

the anode of the PIN diode. See page 6, lines 2-10 and FIG. 1. The first conducting terminal forms a common node between an anode of a PN diode **J1** formed by the control terminal and the first conducting terminal of the control transistor and a corresponding parasitic PN diode **J30**. See page 9, lines 6-12 and FIG. 4 (reproduced below).

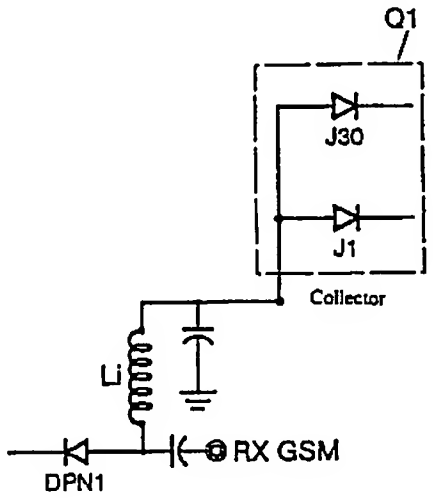


FIG. 4 of the Present Application

The RF switching device advantageously comprises a plurality of RF channels connected to the input/output terminal. Each RF channel may be dedicated to a different transmission standard operating at a different frequency, for example. Each respective control module advantageously has very good radio-frequency isolation when one of the radio-frequency channels is selected in order to reduce the loss of energy in the selected channel. This isolation is based upon the combination of the PIN diode and the control transistor. See page 2, lines 8-12 and page 3, lines 10-24.

More particularly, since the anode of the PIN diode **DPN1** and the anodes of the equivalent diodes of the Q1 transistor (i.e., the anodes of diodes **J1** and **J30**) are connected together, current is not likely to pass through the diode **DPN1**. This is regardless of the voltage applied to the cathode of the diode **DPN1** when the control transistor **Q1** is blocked. The diode **DPN1** therefore remains in its reversed biased state, maintaining a high resistive value. The isolation is not affected, even at high power. See page 9, lines 6-20 and FIG. 4.

Independent Claim 15 is directed to a radio-frequency (RF) switching device **DCM** comprising an input/output terminal **ANT**, a plurality of RF channels (**TX GSM**, **RX GSM**, **TX DCS/PCS**, **RX DCS** and **RX PCS**) connected to the input/output terminal, and a switching circuit for selecting one of the plurality of RF channels based upon a switching control signal (e.g., **EC1**). See page 4, line 19 through page 5, line 14 and FIG. 1. The switching circuit comprises a plurality of control modules connected to the plurality of RF channels (**TX GSM**, **RX GSM**, **TX DCS/PCS**, **RX DCS** and **RX PCS**). Each control module comprises a diode (e.g., **DPN1**) having a cathode connected to the input/output terminal **ANT**, and an anode. See page 5, lines 14-21 and FIG. 1. A control transistor (e.g., **Q1**) comprises a control terminal for receiving the switching control signal (e.g., **EC1**), and a first conducting terminal connected to the anode of the diode. See page 6, lines 2-10 and FIG. 1. The first conducting terminal forms a common node between an anode of a diode **J1** formed by the control terminal and the first conducting terminal of the control transistor, and a corresponding parasitic diode **J30**. See page 9, lines 6-12 and FIG. 4.

Independent Claim 23 is directed to a remote terminal for operating in a wireless communication system and

comprises an antenna **ANT**, a plurality of RF channels (**TX GSM**, **RX GSM**, **TX DCS/PCS**, **RX DCS** and **RX PCS**) connected to the antenna, and a switching circuit **DCM** for selecting one of the plurality of RF channels based upon a switching control signal (e.g., **EC1**). See page 4, line 19 through page 5, line 14 and FIG. 1. The switching circuit **DCM** comprises a plurality of control modules connected to the plurality of RF channels (**TX GSM**, **RX GSM**, **TX DCS/PCS**, **RX DCS** and **RX PCS**). Each control module comprises a diode (e.g., **DPN1**) having a cathode connected to the antenna **ANT**, and an anode. See page 5, lines 14-21 and FIG. 1. A control transistor (e.g., **Q1**) comprises a control terminal for receiving the switching control signal (e.g., **EC1**), and a first conducting terminal connected to the anode of the diode. See page 6, lines 2-10 and FIG. 1. The first conducting terminal forms a common node between an anode of a diode **J1** formed by the control terminal and the first conducting terminal of the control transistor, and a corresponding parasitic diode **J30**. See page 9, lines 6-12 and FIG. 4.

Independent Claim 33 is directed to a method for making an RF switching device **DCM** comprising connecting a plurality of RF channels (**TX GSM**, **RX GSM**, **TX DCS/PCS**, **RX DCS** and **RX PCS**) to an input/output terminal **ANT**, and connecting a switching circuit to the plurality of RF channels for selecting one of the RF channels based upon a switching control signal (e.g., **EC1**). See page 4, line 19 through page 5, line 14 and FIG. 1. The switching circuit comprises a plurality of control modules connected to the plurality of RF channels (**TX GSM**, **RX GSM**, **TX DCS/PCS**, **RX DCS** and **RX PCS**). Each control module comprises a diode (e.g., **DPN1**) having a cathode connected to the input/output terminal **ANT**, and an anode. A control transistor (e.g., **Q1**) comprises a control terminal for receiving the switching control signal

(e.g., **EC1**), and a first conducting terminal connected to the anode of the diode. See page 5, lines 14-21 and FIG. 1. The first conducting terminal forms a common node between an anode of a diode **J1** formed by the control terminal and the first conducting terminal of the control transistor, and a corresponding parasitic diode **J30**. See page 9, lines 6-12 and FIG. 4.

(6) Grounds of Rejection to be Reviewed On Appeal

Claims 9-14, 18, 26 and 36 stand rejected under 35 U.S.C. §103(a) as being unpatentable over the published Tamura patent application (U.S. Published Patent Application No. 2002/0180510) in view of the published Clifton patent application (U.S. Published Patent Application No. 2003/0001787), in view of the Ashar et al. patent (U.S. Patent No. 3,840,886) and in view of the Ogawa patent (U.S. Patent No. 4,386,327).

Claims 15-16, 19-24, 27-34 and 37-40 stand rejected under 35 U.S.C. §103(a) as being unpatentable over the published Tamura patent application in view of the published Clifton patent application and in view of the Ogawa patent.

(7) Arguments

I. The Claims Are Patentable Over Tamura In View Of Clifton, Ashar Et Al. And Ogawa

The Examiner rejected independent Claim 9 and dependent Claims 10-14, 18, 26 and 36 over the published Tamura patent application in view of the published Clifton patent application, in view of the Ashar et al. patent and in view of the Ogawa patent. Since Claims 18, 26 and 36 are respectively dependent from independent Claims 15, 23 and 33, these independent claims will also be discussed.

In the Tamura patent application, the Examiner referenced in FIG. 1 a radio-frequency (RF) switching device **100** comprising an input/output terminal **101**, and a plurality of RF channels **102**, **103** connected to the input/output terminal, and switching means for selecting one of the RF channels based upon a switching control signal.

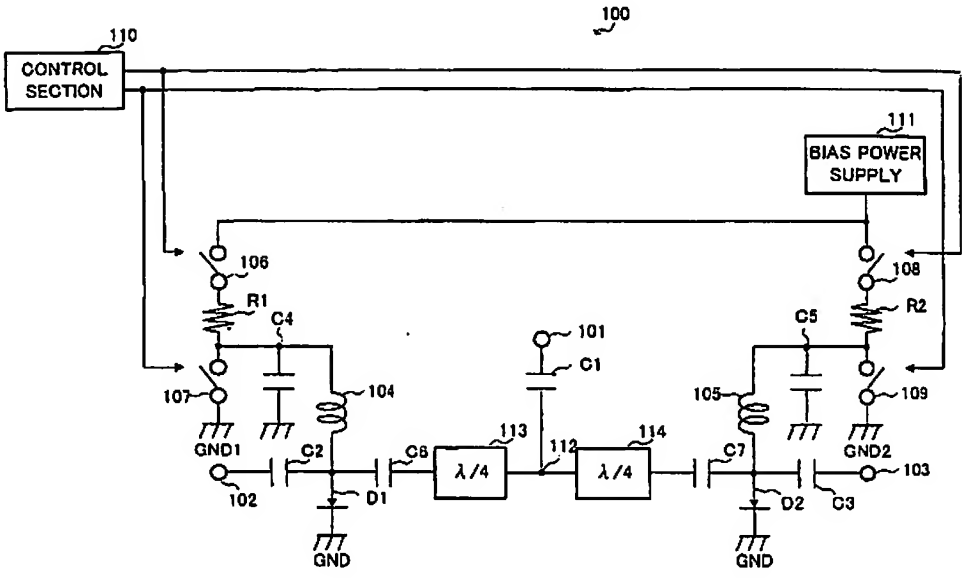


FIG. 1 of Tamura

In FIG. 11c in the Tamura patent application, the Examiner characterized the switching means as comprising a respective control module **307** connected to each RF channel **302**. Each control module **307** comprises a control input **CONT** for receiving the switching control signal, a PIN diode **D1** having a cathode connected to the input/output terminal, and an anode. A control transistor **Q1** comprises a control terminal connected to the control input **CONT**, and a first conducting terminal connected to the anode of the PIN diode **D1**.

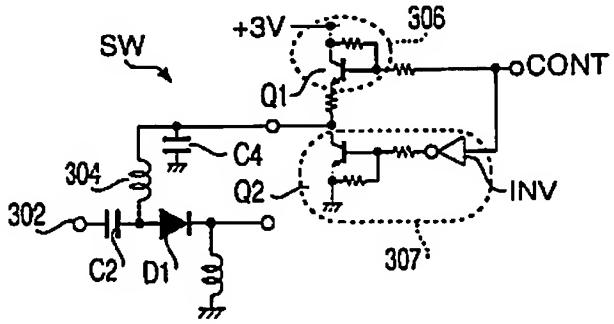


FIG. 11C of Tamura

As correctly noted by the Examiner, the Tamura patent application fails to disclose 1) that RF channel selection is in terms of a plurality of RF channels, and 2) that the first conducting terminal forms a common node between an intersection of an anode of a PN diode formed by the control terminal and the first conducting terminal of the control transistor, and a corresponding parasitic PN diode (as best shown in FIG. 4 in the present application).

The Examiner cited the published Clifton patent application as disclosing element 1) above, which is directed to

a frequency-switching device having a plurality of RF channels. The Examiner cited the Ashar et al. patent and the Ogawa patent as disclosing element 2) above, which in FIG. 13 (in the Ogawa patent) illustrates a transistor **Q20** formed by two diodes **C10, C20**. The two diodes are used to form the common node.

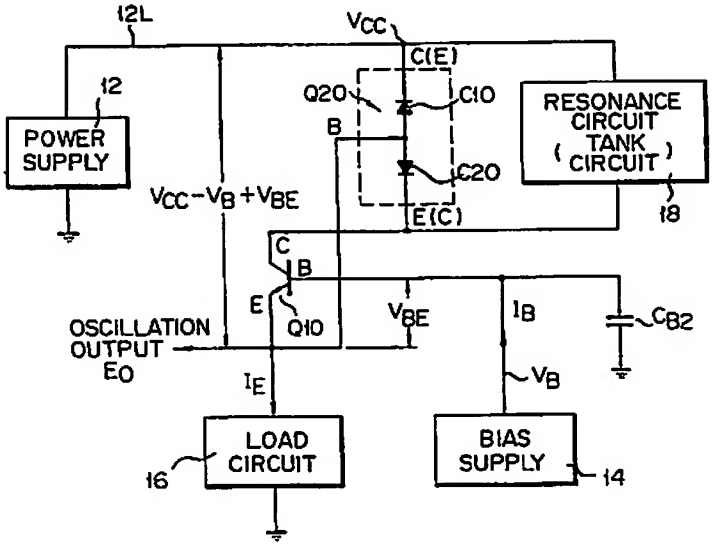


FIG. 13 of Ogawa

The Examiner has taken the position that since the Tamura patent application is used in a radio communication apparatus (paragraph 116), and since the published Clifton patent application is a radio communication apparatus equipped with multi-band capability with an antenna switch, it would have been obvious to modify the switching apparatus of the Tamura patent application with more input/output terminals to make the apparatus a multi-mode apparatus.

The radio communication apparatus in the Tamura patent application is provided with a high frequency switch that

can switch a high frequency signal at high speed. In particular, the communication apparatus comprises a first switch **106** and a second switch **108** that connect control lines to a bias power supply **111**. The high frequency switch has switches loaded in parallel at the respective portions a predetermined wavelength away, respectively, from a branch point of a common terminal **112** toward the respective terminals **102**, **103**. Control lines are connected in parallel to the respective signal lines to supply a bias, respectively, for controlling ON/OFF operation of the switches. A third switch **107** and a fourth switch **109** connect the control lines to the respective ground potentials.

The Appellant submits that the high frequency switch in the Tamura patent application would require further modification for connecting more input/output terminals to the common terminal **112**, and such a modification is beyond the scope of the patent application. For instance, the Tamura patent application requires that the switches be loaded in parallel at the respective portions a predetermined wavelength (1/4 wavelength) from the common terminal **112** to match input/output impedance to prevent generation of reflected waves. Moreover, control of these switches is based upon the control section **110** and their interface with the bias power supply **111**. Adding additional channels increases the complexity of the high frequency switch since additional signals would be required by the control section **110**, and the additional channels would also have to interface with the bias power supply **111**.

The Tamura patent application simply fails to teach or suggest that the high frequency switch can be modified so that the communication device can switch to one of a plurality of channels. In fact, the Tamura patent application teaches the opposite, i.e., only one channel can be selected when a channel

has already been selected. Adding additional channels to the switching device in the Tamura patent application thus increases its complexity that would result in additional work beyond that already disclosed by the Tamura patent application.

The Clifton patent application illustrates in FIG. 2 a triple band antenna switch arrangement. A plurality of transmit connections **TX1**, **TX2** and receive connections **RX1**, **RX2**, **RX3** are connected to an antenna connection **30** via respective signal paths. A single transistor **32** is in each channel path.

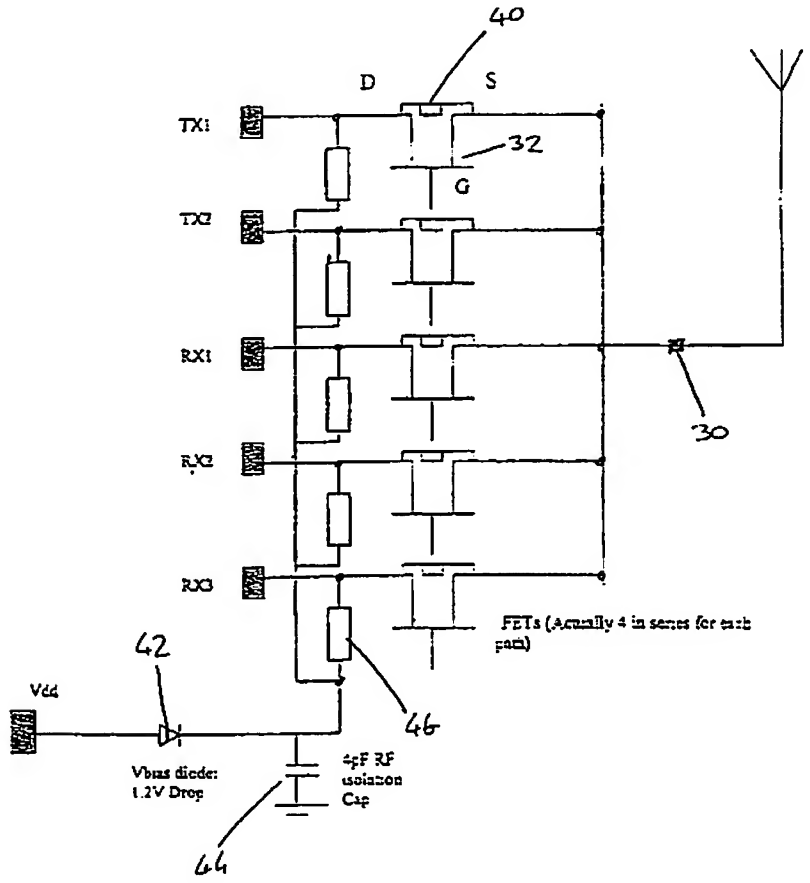


FIG. 2 of Clifton

However, Clifton notes that four series transistors, such as JFETs, may actually be provided in series for each channel path, with the source of one transistor connected to the drain of the adjacent transistor. A resistor **40** bridges the drain and source of each transistor and a bias voltage is provided to the drains and sources of the transistors from a supply voltage Vdd via a diode **42**, a radio frequency isolation capacitor **44** and respective resistors **46**. Even though the Clifton patent application supports selection from among a plurality of channels connected to the antenna, the respective control modules in the claimed invention are distinctly different when compared to how the channels are selected in Clifton.

In addition, the Clifton patent application does not make any reference to high frequency switching. Consequently, one skilled in the art would not be motivated after examining the Tamura patent application to look to the Clifton patent application, particularly since the two applications are directed to different problems. The Tamura patent application is directed to a high frequency switch supporting one of two channels, whereas the Clifton patent application discloses a triple band antenna arrangement.

In addition, there is no motivation to modify the respective control modules in the Tamura patent application so that the first conducting terminal of the control transistor **Q1** (as shown in FIG. 11C) also forms a common node between an intersection of an anode of a PN diode formed by the control terminal and the conducting terminal of the control transistor, and a corresponding parasitic PN diode.

The Tamura patent application fails to mention parasitic diodes. The control module **306** (FIG. 11C) in the Tamura

patent application works in cooperation with switches **307** and **309** so that the high frequency switch is capable of performing a high speed changeover by setting up the switches **307** and **309** as the paths for discharging the electric charge accumulated in the PIN diodes **D1** and **D2** at high speed.

Even though the Ashar et al. patent and the Ogawa patent disclose a transistor formed by two diodes, the Ashar et al. patent fails to mention connecting the transistor as a PN diode with a corresponding parasitic PN diode being associated therewith. The same may be said about the Ogawa combination of the PIN diode and the control transistor having its conducting terminal connected to the anode of the PIN diode and forming the common node between the PN diodes. The Ogawa patent discloses parasitic capacitances but fails to disclose connecting the transistor as a PN diode with a corresponding parasitic PN diode being associated therewith.

In the claimed invention, the RF switching device comprises a plurality of RF channels connected to the input/output terminal. Each respective control module advantageously has very good radio-frequency isolation when one of the radio-frequency channels is selected in order to reduce the loss of energy in the selected channel. As recited in independent Claim 9, this isolation is based upon the combination of the PIN diode and the control transistor having its first conducting terminal connected to the anode of the PIN diode and forming the common node between an anode of a PN diode formed by the control terminal and the first conducting terminal of the control transistor, and a corresponding parasitic PN diode.

The Appellant thus submits that there is no motivation to selectively combine the references as suggested by the Examiner. It is also asserted that the Examiner is impermissibly

using hindsight reconstruction by using the Appellant's specification as a roadmap for combining disjointed prior art references together.

Accordingly, it is submitted that independent Claim 9 is patentable over the Tamura patent application in view of the Clifton patent application, the Ashar et al. patent and the Ogawa patent. Dependent Claims 10-14 are dependent from independent Claim 9. In view of the patentability of independent Claim 9, it is submitted that dependent Claims 10-14, which include yet further distinguishing features of the invention are also patentable. These dependent claims need no further discussion herein.

Dependent Claims 18, 26 and 36 are directed to the control transistor comprising a lateral PNP transistor, with the control terminal forming the base and the first conducting terminal forming the collector of the lateral PNP transistor. The Examiner has taken the position that it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the lateral PNP transistor disclosed by Ashar et al. into the modified RF switching device, remote terminal and method of Tamura, Clifton and Ogawa to obtain a low-voltage and faster switching device.

Dependent Claims 18, 26 and 36 are dependent from independent Claims 15, 23 and 33. Independent Claims 15, 23 and 33 are similar to independent Claim 9. Therefore, it is submitted that these claims are also patentable over the Tamura patent application in view of the Clifton patent application and the Ogawa patent. In view of the patentability of the independent Claims 15, 23 and 33, it is submitted that the dependent Claims 18, 26 and 36, which include yet further distinguishing features of the invention are also patentable.

These dependent claims need no further discussion herein.

II. The Claims Are Patentable Over Tamura In View Of Clifton And Ogawa

The Examiner rejected independent Claims 15, 23 and 33 over the published Tamura patent application in view of the published Clifton patent application and in view of the Ogawa patent.

In the Tamura patent application, the Examiner referenced in FIG. 1 a radio-frequency (RF) switching device **100** comprising an input/output terminal **101**, and a plurality of RF channels **102, 103** connected to the input/output terminal, and a switching circuit for selecting one of the RF channels based upon a switching control signal.

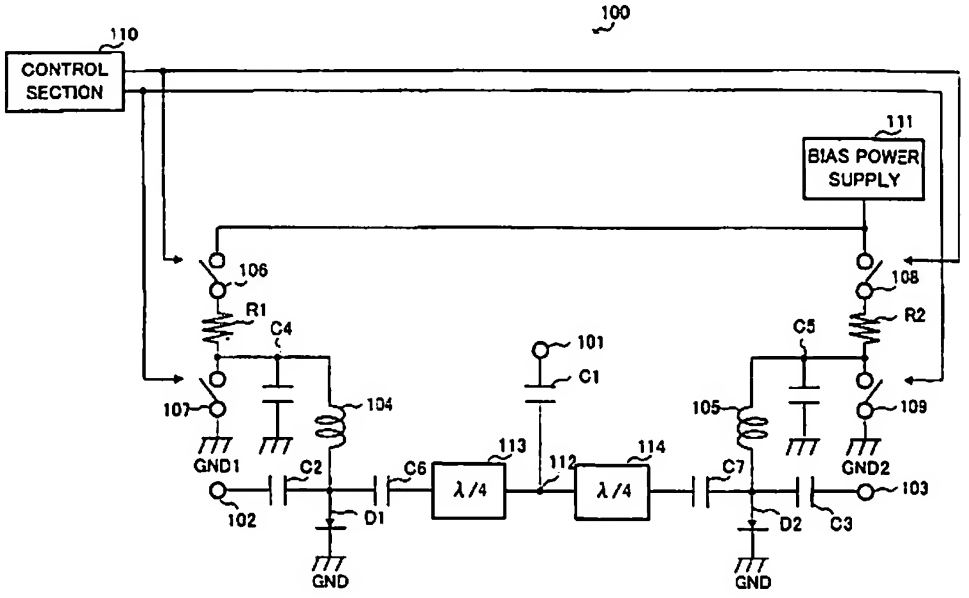
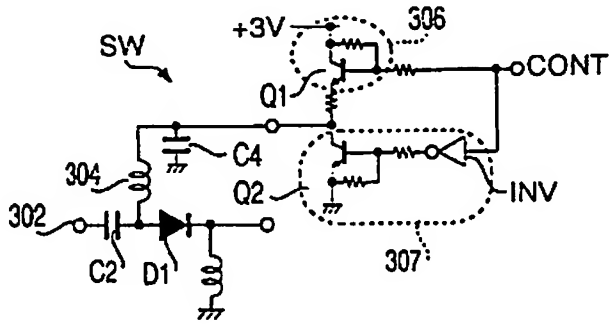


FIG. 1 of Tamura

In FIG. 11c in the Tamura patent application, the Examiner characterized the switching circuit as comprising a plurality of control modules connected to the plurality of RF channels. Each control module **307** comprises a diode **D1** having a cathode connected to the input/output, and an anode. A control transistor **Q1** comprises a control terminal for receiving the switching control signal, and a first conducting terminal connected to the anode of the diode **D1**.



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The Examiner cited the published Clifton patent application as disclosing element 1) above, which is directed to a frequency-switching device having a plurality of RF channels. The Examiner cited the Ogawa patent as disclosing element 2)

above, which in FIG. 13 (in the Ogawa patent) illustrates a transistor **Q20** formed by two diodes **C10, C20.** The two diodes are used to form the common node.

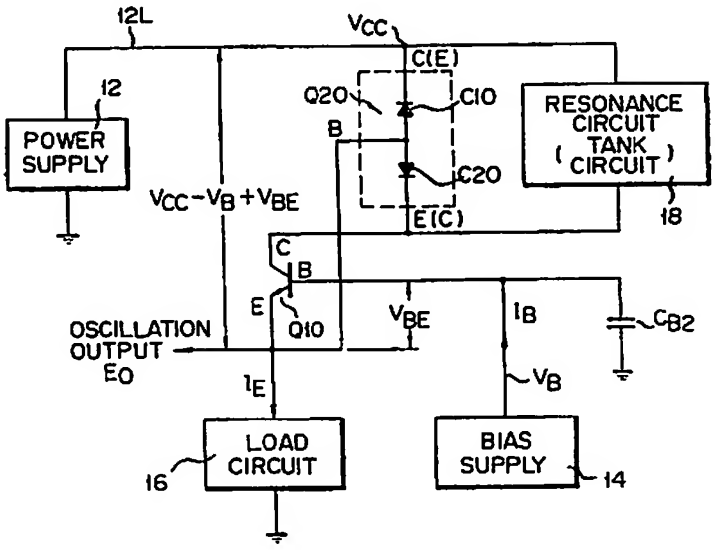

FIG. 13 of Ogawa

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The radio communication apparatus in the Tamura patent application is provided with a high frequency switch that can switch a high frequency signal at high speed. In particular, the communication apparatus comprises a first switch **106** and a

second switch **108** that connect control lines to a bias power supply **111**. The high frequency switch has switches loaded in parallel at the respective portions a predetermined wavelength away, respectively, from a branch point of a common terminal **112** toward the respective terminals **102**, **103**. Control lines are connected in parallel to the respective signal lines to supply a bias, respectively, for controlling ON/OFF operation of the switches. A third switch **107** and a fourth switch **109** connect the control lines to the respective ground potentials.

The Appellant submits that the high frequency switch in the Tamura patent application would require further modification for connecting more input/output terminals to the common terminal **112**, and such a modification is beyond the scope of the patent application. For instance, the Tamura patent application requires that the switches be loaded in parallel at the respective portions a predetermined wavelength (1/4 wavelength) from the common terminal **112** to match input/output impedance to prevent generation of reflected waves. Moreover, control of these switches is based upon the control section **110** and their interface with the bias power supply **111**. Adding additional channels increases the complexity of the high frequency switch since additional signals would be required by the control section **110**, and the additional channels would also have to interface with the bias power supply **111**.

The Tamura patent application simply fails to teach or suggest that the high frequency switch can be modified so that the communication device can switch to one of a plurality of channels. In fact, the Tamura patent application teaches the opposite, i.e., only one channel can be selected when a channel has already been selected. Adding additional channels to the switching device in the Tamura patent application thus increases

its complexity that would result in additional work beyond that already disclosed by the Tamura patent application.

The Clifton patent application illustrates in FIG. 2 a triple band antenna switch arrangement. A plurality of transmit connections **TX1**, **TX2** and receive connections **RX1**, **RX2**, **RX3** are connected to an antenna connection **30** via respective signal paths. A single transistor **32** is in each channel path.

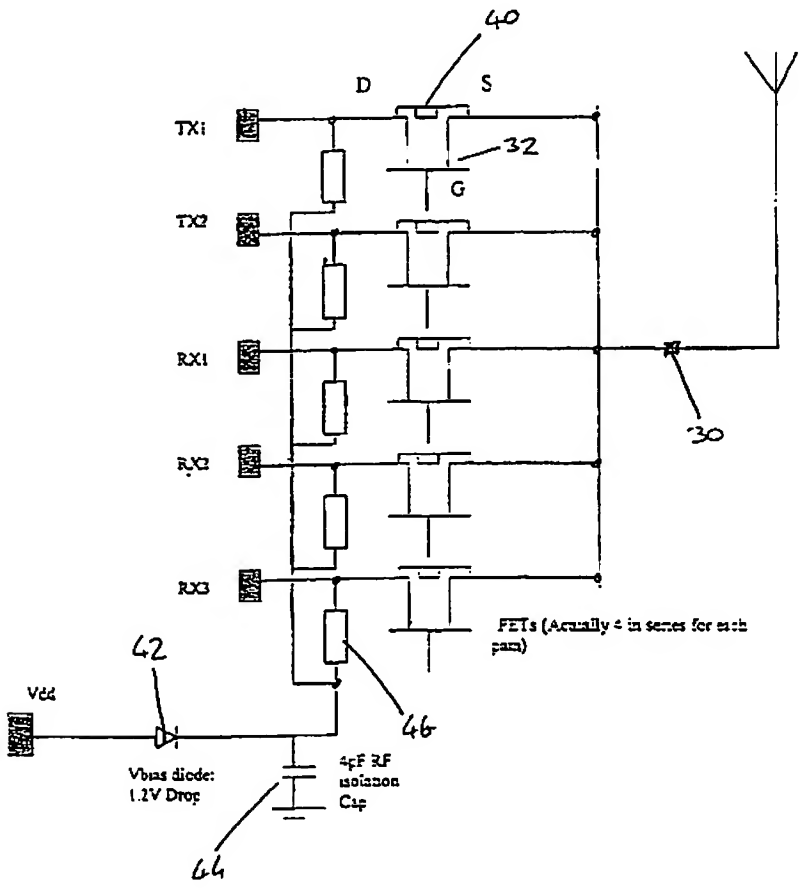

FIG. 2 of Clifton

However, Clifton notes that four series transistors,

such as JFETs, may actually be provided in series for each channel path, with the source of one transistor connected to the drain of the adjacent transistor. A resistor **40** bridges the drain and source of each transistor and a bias voltage is provided to the drains and sources of the transistors from a supply voltage Vdd via a diode **42**, a radio frequency isolation capacitor **44** and respective resistors **46**. Even though the Clifton patent application supports selection from among a plurality of channels connected to the antenna, the respective control modules in the claimed invention are distinctly different when compared to how the channels are selected in Clifton.

In addition, the Clifton patent application does not make any reference to high frequency switching. Consequently, one skilled in the art would not be motivated after examining the Tamura patent application to look to the Clifton patent application, particularly since the two applications are directed to different problems. The Tamura patent application is directed to a high frequency switch supporting one of two channels, whereas the Clifton patent application discloses a triple band antenna arrangement.

In addition, there is no motivation to modify the respective control modules in the Tamura patent application so that the first conducting terminal of the control transistor **Q1** (as shown in FIG. 11C) also forms a common node between an intersection of an anode of a diode formed by the control terminal and the conducting terminal of the control transistor, and a corresponding parasitic diode.

The Tamura patent application fails to mention parasitic diodes. The control module **306** (FIG. 11C) in the Tamura patent application works in cooperation with switches **307** and **309** so that the high frequency switch is capable of performing a high

speed changeover by setting up the switches **307** and **309** as the paths for discharging the electric charge accumulated in the diodes **D1** and **D2** at high speed.

Even though the Ogawa patent discloses a transistor formed by two diodes, there is motivation to connect the transistor as a diode with a corresponding parasitic diode being associated therewith. The same may be said about the Ogawa combination of the diode and the control transistor having its conducting terminal connected to the anode of the diode and forming the common node between the diodes. The Ogawa patent discloses parasitic capacitances but fails to disclose connecting the transistor as a diode with a corresponding parasitic diode being associated therewith.

In the claimed invention, the RF switching device comprises a plurality of RF channels connected to the input/output terminal. Each respective control module advantageously has very good radio-frequency isolation when one of the radio-frequency channels is selected in order to reduce the loss of energy in the selected channel. As recited in independent Claim 15, this isolation is based upon the combination of the diode and the control transistor having its first conducting terminal connected to the anode of the diode and forming the common node between an anode of a diode formed by the control terminal and the first conducting terminal of the control transistor, and a corresponding parasitic diode.

The Appellant thus submits that there is no motivation to selectively combine the references as suggested by the Examiner. It is also asserted that the Examiner is impermissibly using hindsight reconstruction by using the Appellant's specification as a roadmap for combining disjointed prior art references together. Accordingly, it is submitted that

independent Claim 15 is patentable over the Tamura patent application in view of the Clifton patent application, the Ashar et al. patent and the Ogawa patent.

Independent Claims 23 and 33 are similar to independent Claim 15. Therefore, it is submitted that these claims are also patentable over the Tamura patent application in view of the Clifton patent application and the Ogawa patent. In view of the patentability of the independent Claims 15, 23 and 33, it is submitted that the dependent claims, which include yet further distinguishing features of the invention are also patentable. These dependent claims need no further discussion herein.

III. CONCLUSIONS

In view of the foregoing arguments, it is submitted that all of the claims are patentable over the prior art. Accordingly, the Board of Patent Appeals and Interferences is respectfully requested to reverse the earlier unfavorable decision by the Examiner.

Respectfully submitted,

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APPENDIX A - CLAIMS ON APPEAL
FOR U.S. PATENT APPLICATION SERIAL NO. 10/606,189

9. A radio-frequency (RF) switching device comprising:

an input/output terminal;

a plurality of RF channels connected to said input/output terminal; and

switching means for selecting one of said plurality of RF channels based upon a switching control signal, said switching means comprising

a respective control module connected to each RF channel, each control module comprising

a control input for receiving the switching control signal,

a PIN diode having a cathode connected to said input/output terminal, and an anode, and

a control transistor comprising a control terminal connected to said control input, and a first conducting terminal connected to the anode of said PIN diode, the first conducting terminal forming a common node between an anode of a PN diode formed by the control terminal and the first conducting terminal of said control transistor and a corresponding parasitic PN diode.

10. An RF switching device according to Claim 9, wherein said control transistor comprises a lateral PNP transistor, and the control terminal forms the base and the first

conducting terminal forms the collector of said lateral PNP transistor.

11. An RF switching device according to Claim 9, further comprising a substrate, and wherein said switching means is formed therein so that the RF switching device is an integrated circuit.

12. An RF switching device according to Claim 9, wherein said input/output terminal comprises an antenna; and wherein said plurality of RF channels comprise channels dedicated to transmission and channels dedicated to reception.

13. An RF switching device according to Claim 12, wherein said dedicated channels support different transmission standards operating at different frequencies.

14. An RF switching device according to Claim 13, wherein the different transmission standards comprise at least one of a GSM, a DCS, a PCS and a WCDMA standard.

15. A radio-frequency (RF) switching device comprising:

an input/output terminal;

a plurality of RF channels connected to said input/output terminal; and

a switching circuit for selecting one of said plurality of RF channels based upon a switching control signal, said switching circuit comprising

a plurality of control modules connected to said plurality of RF channels, each control module

comprising

a diode having a cathode connected to said input/output terminal, and an anode, and

a control transistor comprising a control terminal for receiving the switching control signal, and a first conducting terminal connected to the anode of said diode, the first conducting terminal forming a common node between an anode of a diode formed by the control terminal and the first conducting terminal of said control transistor, and a corresponding parasitic diode.

16. An RF switching device according to Claim 15, wherein said diode comprises a PIN diode.

18. An RF switching device according to Claim 15, wherein said control transistor comprises a lateral PNP transistor, and the control terminal forms the base and the first conducting terminal forms the collector of said lateral PNP transistor.

19. An RF switching device according to Claim 15, further comprising a substrate, and wherein said switching circuit is formed therein so that the RF switching device is an integrated circuit.

20. An RF switching device according to Claim 15, wherein said input/output terminal comprises an antenna; and

wherein said plurality of RF channels comprise channels dedicated to transmission and channels dedicated to reception.

21. An RF switching device according to Claim 20, wherein said dedicated channels support different transmission standards operating at different frequencies.

22. An RF switching device according to Claim 21, wherein the different transmission standards comprise at least one of a GSM, a DCS, a PCS and a WCDMA standard.

23. A remote terminal for operating in a wireless communication system and comprising:

an antenna;

a plurality of RF channels connected to said antenna; and

a switching circuit for selecting one of said plurality of RF channels based upon a switching control signal, said switching circuit comprising

a plurality of control modules connected to said plurality of RF channels, each control module comprising

a diode having a cathode connected to said antenna, and an anode, and

a control transistor comprising a control terminal for receiving the switching control signal, and a first conducting terminal connected to the anode of said diode, the first conducting terminal forming a common node between an anode of a diode formed by the control terminal and the

first conducting terminal of said control transistor, and a corresponding parasitic diode.

24. A remote terminal according to Claim 23, wherein said diode comprises a PIN diode.

26. A remote terminal according to Claim 23, wherein said control transistor comprises a lateral PNP transistor, and the control terminal forms the base and the first conducting terminal forms the collector of said lateral PNP transistor.

27. A remote terminal according to Claim 23, further comprising a substrate, and wherein said switching circuit is formed therein so that the RF switching device is an integrated circuit.

28. A remote terminal according to Claim 23, wherein said plurality of RF channels comprise channels dedicated to transmission and channels dedicated to reception.

29. A remote terminal according to Claim 28, wherein said dedicated channels support different transmission standards operating at different frequencies.

30. A remote terminal according to Claim 29, wherein the different transmission standards comprise at least one of a GSM, a DCS, a PCS and a WCDMA standard.

31. A remote terminal according to Claim 23, wherein said antenna, said plurality of RF channels and said switching

circuit are configured so that the remote terminal is a mobile cellular telephone.

32. A remote terminal according to Claim 23, further comprising a processor for providing the switching signal to said switching circuit.

33. A method for making a radio-frequency (RF) switching device comprising:

connecting a plurality of RF channels to an input/ output terminal; and

connecting a switching circuit to the plurality of RF channels for selecting one of the RF channels based upon a switching control signal, the switching circuit comprising a plurality of control modules connected to the plurality of RF channels, each control module comprising

a diode having a cathode connected to the input/output terminal, and an anode, and

a control transistor comprising a control terminal for receiving the switching control signal, and a first conducting terminal connected to the anode of the diode, the first conducting terminal forming a common node between an anode of a diode formed by the control terminal and the first conducting terminal of the control transistor, and a corresponding parasitic diode.

34. A method according to Claim 33, wherein the diode comprises a PIN diode.

36. A method according to Claim 33, wherein said

control transistor comprises a lateral PNP transistor, and the control terminal forms the base and the first conducting terminal forms the collector of said lateral PNP transistor.

37. A method according to Claim 33, further comprising a substrate, and wherein the switching circuit is formed therein so that the RF switching device is an integrated circuit.

38. A method according to Claim 33, wherein the input/output terminal comprises an antenna; and wherein the plurality of RF channels comprise channels dedicated to transmission and channels dedicated to reception.

39. A method according to Claim 38, wherein the dedicated channels support different transmission standards operating at different frequencies.

40. A method according to Claim 39, wherein the different transmission standards comprise at least one of a GSM, a DCS, a PCS and a WCDMA standard.

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Serial No. **10/606,189**
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APPENDIX B – EVIDENCE APPENDIX
PURSUANT TO 37 C.F.R. § 41.37(c)(1)(ix)

None.

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APPENDIX C – RELATED PROCEEDINGS APPENDIX
PURSUANT TO 37 C.F.R. § 41.37(c)(1)(x)

None.